

Brookhaven National Laboratory Service Station Facility

Facility Environmental Monitoring Report

Calendar Year 2001



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Summary of Results: During CY 2001, high levels of carbon tetrachloride (up to 1,621 µg/L) were detected in a number of wells used to monitor Service Station operations. The carbon tetrachloride was released from a former underground storage tank that was used for a Chemistry Department experiment in the 1950s. This tank was located approximately 200 feet northwest (upgradient) of the station. Low levels of xylenes (from petroleum products) and the solvent tetrachloroethylene (up to 8.3 µg/L and 9.8µg/L, respectively) were detected in several monitoring wells located directly downgradient of the station. Additionally, the gasoline additive MTBE was detected in two wells at a maximum concentration of 64 µg/L. Available information indicates that the Service Station's underground storage tanks and associated distribution lines are not leaking and that all waste oils and used solvents are being properly stored and recycled. Therefore, it is believed that the petroleum hydrocarbon related compounds and solvents detected in groundwater originate from historical vehicle maintenance and fuel dispensing operations prior to improved chemical storage and handling controls implemented in 1989.

Background

Building 630 is a commercial automobile service station, which is privately operated under a contract with BNL. The station, which was built in 1966, is used for automobile repair and gasoline sales.

Potential environmental concerns at the Service Station include the historical use of underground storage tanks (USTs) for the storage of gasoline and waste oil, hydraulic fluids used for lift stations, and the use of solvents for parts cleaning. When the service station was built in 1966, the UST inventory consisted of two 8,000 gallon-capacity and one 6,000 gallon-capacity tanks for the storage of gasoline, and one 500 gallon-capacity tank for used motor oil. An inventory discrepancy discovered in 1967, suggested that up to 8,000 gallons of gasoline might have leaked from one of the USTs. There are no records of remedial actions other than the replacement of the tank, and to loss of 8,000 gallons of gasoline has never been confirmed. In August 1989, the USTs, pump islands and associated piping were upgraded to conform to Suffolk County Article 12 requirements for secondary containment, leak detection devices and overfill alarms. During the removal of the old USTs, there were no obvious signs of soil contamination.

The present tank inventory includes three 8,000 gallon-capacity USTs used for the storage of unleaded gasoline, and one 500 gallon-capacity UST used for waste oil. The facility also has three vehicle lift stations.

Environmental Monitoring Program

In 1996, BNL established a groundwater monitoring program at the Service Station to evaluate potential impacts to environmental quality and to demonstrate compliance with DOE requirements and applicable federal, state and local laws, and regulations. The environmental monitoring program for the Service Station is described in the BNL Environmental Monitoring Plan (Daum *et al.* 2000; BNL, 2001a).

Monitoring Results

Groundwater

The Service Station's groundwater monitoring program is designed to confirm that the engineered and institutional controls in place are effective in preventing contamination of the aquifer. Five wells are used to monitor for potential contaminant releases (Figure 1). Three of these wells (085-235, 085-236 and 085-237) were installed in January 2000 to improve BNL's ability to monitor the quality of groundwater in this area.

Groundwater quality in the Service Station area has been impacted by historical small-scale spills of oils, gasoline, and solvents, and by carbon tetrachloride contamination associated with a nearby underground storage tank that was used as part of an experiment conducted in the 1950s. In April 1998, BNL removed an underground storage tank from an area located approximately 200 feet to the northwest (upgradient) of the Service Station. Although there are indications that the tank was releasing small quantities of carbon tetrachloride prior to the tank removal, the detection of a significant increase in carbon tetrachloride concentrations in groundwater suggests that additional amounts of this chemical were inadvertently released during the excavation and removal process. BNL started to remediate the carbon tetrachloride plume in October 1999.

During 2001, carbon tetrachloride continued to be observed in Service Station monitoring wells (Tables 1 and 2). The maximum carbon tetrachloride concentration was 1,621 µg/L observed in well 085-16. These concentrations are less than those observed in CY 2000, when carbon tetrachloride concentrations in Service Station area wells approached 4,400 µg/L. The New York State Ambient Water Quality Standard (NYS AWQS) for carbon tetrachloride is 5 µg/L.

Compared to monitoring results for CY 2000 when high levels of petroleum hydrocarbon related compounds were detected in several downgradient wells, only low levels of xylenes were detected during 2001 (see BNL, 2001b). The gasoline additive methyl tertiary butyl ether (MTBE) continues to be detected wells 085-236 and 085-237. MTBE levels increased from approximately 5 µg/L in 2000, to a maximum concentration of 64 µg/L in 2001. MTBE has been in use as a gasoline additive since 1977, and it is likely that the MTBE detected in the Service Station wells is related to historical small-scale

spillage. The NYS AWQS for MTBE is 10 µg/L. Tetrachloroethylene (up to 9.8 µg/L) was also detected in a number of Service Station area wells, and it is probably related to historical degreasing operations. No floating petroleum was detected in the monitoring wells.

Evaluation of Service Station Operations

During 2001, there were no reported fuel losses or spills that could impact groundwater quality, and all waste oils and used solvents generated from current operations are being properly stored and recycled. BNL conducted a full evaluation of Service Station operations in June 2000, following the discovery of petroleum hydrocarbon related chemicals in monitoring wells located downgradient of the Service Station. The investigation concluded that the contamination observed in the groundwater was not related to current operations. An evaluation of the electronic leak detection system monitoring and daily product reconciliation (i.e., an accounting of the volume of gasoline stored in underground storage tanks and volume of gasoline sold) indicated that there were no indications that the underground storage tanks or associated piping are leaking (Sack, 2000).

Future Monitoring Actions

The following actions are recommended for the CY 2002 monitoring period:

- Maintain the groundwater monitoring program on its current semiannual schedule.
- The Environmental Restoration program will continue to remediate the carbon tetrachloride plume.

References

BNL, 2001a. *Brookhaven National Laboratory Environmental Monitoring Plan, CY 2001 Update* (January 2001). BNL-52584 Update.

BNL, 2001b. *Service Station Facility: Facility Environmental Monitoring Report for Calendar Year 2000* (April 10, 2001).

Daum, M., Dorsch, W., Fry, J., Green, T., Lee, R., Naidu, J., Paquette, D., Scarpitta, S., and Schroeder, G., 2000. *Brookhaven National Laboratory, Environmental Monitoring Plan 2000* (March 31, 2000).

Sack, B., 2000. Memo from B. Sack to T. Sheridan, *Groundwater Contamination at Building 630 – On-Site Gas Station* (July 11, 2000).

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Volatile Organic Compound Analytical Results for March 2001
Table 1

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-016 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	92.5 D	1,621 D	2,353 D	394 D	389 D
Methylene chloride**	5	<2.0	<2.0	<2.0	<2.0	<2.0
Chloroform**	7	3.1	19.1	25.5	10.7	7.4
Toluene	5	<2.0	<2.0	<2.0	<2.0	<2.0
Tetrachloroethylene (PCE)	5	<2.0	<2.0	9.8	4.9	<2.0
Ethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
m,p-Xylenes	5	<2.0	<2.0	<2.0	<2.0	<2.0
o-Xylene	5	<2.0	<2.0	<2.0	<2.0	<2.0
Isopropylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
n-propylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
1,3,5-Trimethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,4-Trimethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
1,1,1-trichloroethane	5	2.9	<2.0	<2.0	<2.0	<2.0
Naphthalene	10	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl tertiary butyl ether (MTBE)	10	<2.0	<2.0	<2.0	4.1	<2.0
Total VOC Concentration	--	98.5	1,640.1	2,388.3	413.7	396.4

(a): Standard not established – default value shown.

B: Compound also detected in blank sample.

J: Estimated analytical value.

D: Analytical value following dilution.

NA: Compound not analyzed for.

** : Primary breakdown products of carbon tetrachloride.

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Volatile Organic Compound Analytical Results for September 2001
Table 2

Compound	NYS AWQS (µg/L)	Well 085-235 (µg/L)	Well 085-016 (µg/L)	Well 085-017 (µg/L)	Well 085-236 (µg/L)	Well 085-237 (µg/L)
Carbon tetrachloride	5	151 D	1,206 D	607 D	279 D	202.4 D
Methylene chloride**	5	<2.0	<2.0	<2.0	<2.0	<2.0
Chloroform**	7	10.8	23.9	14.1	12.1	9.2
Toluene	5	<2.0	<2.0	<2.0	<2.0	<2.0
Tetrachloroethylene (PCE)	5	<2.0	3.5	3.3	4.6	2.2
Ethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
m,p-Xylenes	5	<2.0	3.2	<2.0	<2.0	<2.0
o-Xylene	5	<2.0	5.1	<2.0	<2.0	<2.0
Isopropylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
n-propylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
1,3,5-Trimethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
1,2,4-Trimethylbenzene	5	<2.0	<2.0	<2.0	<2.0	<2.0
Naphthalene	10	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl tertiary butyl ether (MTBE)	10	<2.0	<2.0	<2.0	55.6 D	64.0 D
Total VOC Concentration	--	161.8	1,241.7	624.4	351.3	277.8

(a): Standard has not been established. Default value shown.

B: Compound also detected in blank sample.

J: Estimated analytical value.

D: Analytical value following dilution.

NA: Compound not analyzed for.

** : Primary breakdown products of carbon tetrachloride.

